1. **Virtual reality training has been proposed as an adjunct in stroke rehabilitation in recent years. Please translate the following English texts about virtual reality technology into *CHINESE* texts. (20%)**

"Interaction in 3-dimensions is a key characteristic that distinguishes a virtual-reality experience from watching a movie. The realistic virtual experience is fostered by such specialized technology as head-mounted displays, tracking systems, earphones, and gesture-sensing gloves. A head-mounted display is an image display system worn on the head, which remains optically coupled to the user's eyes as he/she turns and moves. A tracking system senses the position and orientation of the user's head (and the head-mounted display) and reports that information to a computer that updates (in real time) the images for display in the display system. In most cases, full-color stereo image pairs are produced, and earphones may also deliver relevant 3-dimensional sound. ..... Application of this innovative technology in rehabilitation is promising." [Adopted from Bogey RA et al., Arch Phys Med Rehabil 2004;85(3 suppl 1):S15-20.]

2. **After reading the following texts adopted from a review article on spinal cord injury (SCI) written by Ramer and colleagues and published in the journal Spinal Cord (2005;43:134-51), please answer questions A and B in *ENGLISH*, using full sentences. (20%)**

"Treadmill training has been used with considerable success in people with SCI, classified as functionally incomplete,[352] that is, with retention of some sensory or motor function below the level of injury (ASIA scale B-D). Persons were selected if they had some voluntary activity in leg muscles, had mobile joints, had no spasticity and if they lacked complications such as ulceration or infection. Treadmill training involved sessions of 30-60 min, 5 days a week for 3 weeks to 5 months, starting with low treadmill speeds. The aim was to encourage movements that mimic natural walking as much as possible and involved providing maximal sensory feedback from the muscles, joints, and skin.

Initially, partial body-weight support was provided by a harness, and the legs were moved and the feet were placed on the treadmill by physiotherapists. Persons were encouraged to put their full body weight onto the extended (say, right) leg during the stand phase and then shift their body weight onto the left leg just before swinging the right leg forward. As performance improved, persons were encouraged to swing their arms in the way they would if walking naturally. Persons were also encouraged to attempt overground walking as soon as possible. The study included comparison with persons who had previously received conventional physiotherapy only. Treadmill training, rather than conventional physiotherapy, resulted in remarkable improvements. Of 44 patients that were wheelchair-bound, over two thirds learned to walk independently, at least for short distances, with only one person not showing any improvement; about half of these patients were capable of walking up stairs. Seven paraplegic persons classified as complete, that is, no function below the level of injury, were also included in the study and were selected because some

見背面

aspects of stepping could be evoked by placing them on the treadmill. However, despite daily training, no improvements were seen, and they were not able to generate full stepping cycles. Follow-up studies in persons with incomplete injuries were encouraging and showed that improvements made during a few weeks to months of treadmill training were maintained for 6 months to 6 1/2 years after training ceased."

Question A: What were the key features of the treadmill training program and the training protocol of the particular study described in this review article? (10%)

Question B: What were the differences in treatment outcomes between patients with incomplete spinal cord injury and those with complete spinal cord injury? (10%)

3. **After reading the following *Introduction* section adopted from a recently published paper by David A Brown and colleagues in Physical Therapy (2005;85:159-68), please answer questions A and B in *ENGLISH*, using your own words and full sentences. (20%)**

"For many people in the early stages following stroke, cyclical leg exercise is a safe, task-oriented locomotor intervention that is used to supplement functional ambulation training.[9–12] The kinematic patterns of both locomotor tasks are similar. Both locomotor tasks are cyclical; require reciprocal flexion and extension movements of hip, knee, and ankle; and have alternating muscle activation of antagonists[13,14] in a well-timed and coordinated manner. Kautz and Brown[9] reported that successful cyclical leg exercise requires that the legs, whether impaired or not, follow essentially the same trajectory. Because many characteristics of cyclical leg exercise are similar to those of walking, cyclical leg exercise can potentially play a valuable role as an adjunctive form of locomotor intervention for people with ambulatory dysfunction in the acute rehabilitation setting. Although cyclical leg exercise is not walking, the task of maintaining a simplified locomotor pattern and simultaneously supporting partial body weight and learning to weight shift is task-oriented rather than muscle-specific (eg, exercises that target specific muscle groups in planar movements or nonfunctional patterns of movement).

Ergometer cycling offers training characteristics that differ from those of walking, some of which are advantageous to the study of mobility and muscle coordination.[9–11] Because balance is not a factor in seated pedaling, individuals are not subjected to risky postural disturbances associated with the initial stages of upright locomotor training. By excluding balance from the demands of the locomotor task, individuals may be more independent and capable of focusing their attention on resolving lower-limb locomotor impairments, such as muscle weakness, that contribute to walking dysfunction. In locomotor activities that are free from balance demands, existing muscle coordination patterns applicable to propulsion will dominate over patterns associated with balance reactions.[12]

A limitation to traditional cyclical leg exercise is the lack of weight bearing and weight shifting required. In contrast, walking involves the task of shifting weight while performing a cyclical and

接次頁

repetitive task, such that the ability to bear weight dynamically (ie, periodically adjusting to task demands) on the lower extremities underlies ambulation capability.[15] Walking requires that people have adequate lower-extremity force-generating capacity for weight bearing and the ability to time lower-extremity musculature appropriately to load, unload, flex, and extend during specific points in the gait cycle. Weight shift during walking requires bilateral coordination for controlled weight transfer while continuing on a cyclic trajectory. Therefore, we sought to develop an intervention that could include weight bearing demands as an added dimension to the task of cyclical leg exercise."

Question A: According to the authors of this paper, what are the similarities and differences between walking exercises and traditional cycling leg exercises using ergometers? (15%)

Question B: Do these authors regard cyclic leg exercises as task-oriented exercises or muscle-specific exercises? Why? (5%)

4. ***Please answer the following questions in ENGLISH after reading the following abstract.***

Question A: What is the definition of 'cathode' in electrotherapy? (10%)

Question B: It has been proved that electric fields regulate the extent and the direction of nerve growth in vivo, by inducing nerves to turn and that they also regulate the rate of wound healing. Best direction of electrical field to improve nerve regeneration is from proximal to distal or forms distal to proximal? (10%)

The Effects of Electroacupuncture on Peripheral Nerve Regeneration in Rats

Abstract

This study was designed to examine the effects of electroacupuncture with direct current (DC) on peripheral nerve regeneration.

The left sciatic nerve of 55 7-month-old rats was crushed at the thigh. They were randomly allocated to four groups: distal cathode DC group (n=15), distal anode DC group (n=14), sham operated group (n=13), and control group (n=13). In the distal cathode DC group, a cathode electrode was connected to an insulated acupuncture needle inserted at 1 cm distal to the injured site, while an anode electrode was connected to a needle inserted at 1 cm proximal to the lesion. In the distal anode DC group, the anode and the cathode electrode were connected to the needle at 1cm distal and proximal to the lesion respectively. In the sham operated group, no electrical stimulation was given to the insulated needle inserted at the same site, and in the control group, no treatment was given. Regeneration of the sciatic nerve was evaluated by the number of evoked EMGs recorded at 12 sites in the plantar region, by their latency, and by the weight ratio of the tibialis anterior at four weeks after the crush injury.

Regeneration of the peripheral nerve was faster and more accelerated in the distal cathode DC group than in the other groups, while in the distal anode DC group the regeneration was delayed. This result suggested electroacupuncture with cathode distal orientation might be a useful treatment having the advantage of enabling deeper insertion with minimal tissue damage. (Acupuncture in Medicine 2003 Vol 21(1-2) double issue, Page 9-17)

見背面

5. ***Please answer the following questions in CHINESE after reading the following abstract:***

Question A: What are the possible causes of post-polio syndrome? (8%)

Question B: Please explain the basic principle to design a physical therapy program for a patient with PPS. (12%)

Postpolio Syndrome

Accepted criteria for diagnosis of postpolio syndrome (PPS) are a prior history of poliomyelitis, a stable period after recovery, a residual deficit of the initial polio, new muscle weakness, and, sometimes, new muscle atrophy. Fatigue and muscle pain need not be present to meet the criteria for the syndrome.

One possible cause of PPS is decompensation of a chronic denervation and reinnervation process to the extent that the remaining healthy motor neurons can no longer maintain new sprouts; thus, denervation exceeds reinnervation.

A second possible mechanism for PPS is motor neuronal loss due to reactivation of a persistent latent virus. In addition to muscle atrophy and denervation, foci of perivascular and interstitial inflammatory cells have been found on 50% of biopsies of patients with PPS. Activated T cells and immunoglobulin M and immunoglobulin G antibodies specific for gangliosides also have been found.

Another possibility is an infection of the polio survivor's motor neurons by an enterovirus that is different from the one responsible for the patient's polio. Others sources hypothesize that PPS is merely the loss of strength due to the usual stresses of aging and weight gain. In patients with PPS, these processes occur in muscles that already are weak, so the consequences are more noticeable compared with those of patients who have not had polio. (http://www.emedicine.com/pmr/topic110.htm)

試題隨卷繳回